The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (currently amended): An apparatus for measuring a constituent content of an agricultural product, comprising:

a device for forming a stream of the agricultural product;

an optical sensing window in the device allowing passage of radiation from a radiation source to pass through the stream of agricultural product to a receiver, the optical sensing window being configured, in comparison to the device, to provide a narrower passageway for the stream of agricultural product to provide for a more uniform consistency in the stream of agricultural product ~~for passing the stream of the agricultural product~~;

a radiation source for irradiating the stream of the agricultural product as the stream of the agricultural product passes through the optical sensing window;

a receiver for receiving radiation transmitted from the radiation source through the stream of agricultural product and the optical sensing window, ~~through the stream of the agricultural product~~ and for converting the received radiation into a corresponding electrical signal; and

a computer, coupled to the receiver, for receiving the electrical signal and for processing the electrical signal to generate data for use in determining a constituent content of the agricultural product.

Claim 2 (currently amended): The apparatus of claim 1 wherein the receiver includes:

a fiber optic cable;

a sensor head for receiving the radiation transmitted from the radiation source through the stream of agricultural product and the optical sensing window, ~~through the stream of the agricultural product~~ and for focusing the received radiation onto the fiber optic cable; and

a spectrometer, coupled to the fiber optic cable, for converting the received radiation into the corresponding electrical signal.

Claim 3 (original): The apparatus of claim 2 wherein the fiber optic cable comprises a single fiber optic cable.

Claim 4 (original): The apparatus of claim 2 wherein the sensor head includes:

a fiber optic probe coupled to the fiber optic cable; and

a plurality of optical lenses positioned between the optical sensing window and the fiber optic cable for focusing the received radiation onto the fiber optic probe.

Claim 5 (original): The apparatus of claim 1, further including a housing for containing the device, the radiation source, the optical sensing window, and the receiver.

Claim 6 (original): The apparatus of claim 5, further including a fan mounted within the housing.

Claim 7 (original): The apparatus of claim 1, further including an inlet, coupled to the device, for attachment to a source providing the agricultural product.

Claim 8 (original): The apparatus of claim 7 wherein the inlet is configured to receive the agricultural product from a combine.

Claim 9 (original): The apparatus of claim 1 wherein the device receives the agricultural product from a grain pipe.

Claim 10 (original): The apparatus of claim 1 wherein the optical sensing window includes:

an inner wall;

an outer wall; and

a pair of side walls,

wherein the inner wall, the outer wall, and the pair of side walls are joined to form a passageway for the agricultural product.

Claim 11 (original): The apparatus of claim 10 wherein:

the inner wall is formed from an optically transparent material; and

the outer wall and the pair of side walls are formed from an opaque material.

Claim 12 (original): The apparatus of claim 11 wherein the inner wall includes:

a front planar section; and

a pair of curved edges.

Claim 13 (original): The apparatus of claim 10 wherein the outer wall includes a transparent aperture for permitting the radiation to pass through the stream of the agricultural product and to the receiver.

Claim 14 (currently amended): A method for measuring constituent contents of an agricultural product, comprising:

forming a stream of the agricultural product;

passing the stream of the agricultural product through an optical sensing window allowing passage of radiation from a radiation source to pass through the stream of agricultural product to a receiver, the optical sensing window being configured, in comparison to the device, to provide a narrower passageway for the stream of agricultural product to provide for a more uniform consistency in the stream of agricultural product;

irradiating the stream of the agricultural product as the stream of the agricultural product passes through the optical sensing window;

receiving radiation transmitted from the radiation source through the stream of agricultural product and the optical sensing window, ~~through the stream of the agricultural product~~ and converting the received radiation into a corresponding electrical signal; and

receiving the electrical signal and processing the electrical signal to generate data for use in determining a constituent content of the agricultural product.

Claim 15 (original): The method of claim 14 wherein the receiving radiation step includes:

receiving the radiation transmitted through the stream of the agricultural product and focusing the received radiation onto a fiber optic cable; and

converting the received radiation from the fiber optic cable into the corresponding electrical signal.

Claim 16 (original): The method of claim 15 wherein the receiving the radiation step includes focusing the received radiation onto a single fiber optic cable.

Claim 17 (original): The method of claim 14 wherein the receiving radiation step includes using a plurality of optical lenses for focusing the received radiation onto a fiber optic probe coupled to the fiber optic cable.

Claim 18 (original): The method of claim 14, further including providing an inlet for attachment to a source providing the agricultural product.

Claim 19 (original): The method of claim 18 wherein the providing step includes configuring the inlet to receive the agricultural product from a combine.

Claim 20 (original): The method of claim 13, further including receiving the agricultural product from a grain pipe.

Claim 21 (original): A method for converting a light signal into an electrical signal for use in predicting a constituent content of an agricultural product, comprising:

receiving a light signal from an agricultural product;

converting the light signal into an electrical signal;

digitizing the electrical signal to produce a plurality of data points; and

normalizing the data points using a reference signal value to produce a plurality of normalized data points, the normalized data points having values related to a constituent content of the agricultural product, wherein the reference signal value is related to a magnitude at a wavelength of the light signal substantially unaffected by the constituent content.

Claim 22 (original): The method of claim 21 wherein the normalizing step includes using, as the reference signal value, a value derived from the magnitude using a mathematical function.

Claim 23 (original): The method of claim 21 wherein the normalizing step includes using as the reference signal value a value related to magnitudes at a plurality of wavelengths including the wavelength of the light signal substantially unaffected by the constituent content.

Claim 24 (original): The method of claim 21 wherein the normalizing step includes using as the reference signal value an average magnitude value of a range of magnitude values at a pair of wavelengths centered around the reference wavelength.

Claim 25 (original): The method of claim 21, further including predicting protein content of the agricultural product using the plurality of normalized data points.

Claim 26 (original): The method of claim 21, further including:

receiving geographical coordinates corresponding with a geographical location of the agricultural product; and

associating the geographical coordinates with the constituent content of the agricultural product.

Claim 27 (original): The method of claim 26, further including:

receiving a plurality of geographical coordinates corresponding with geographical locations of a plurality of agricultural products for which the constituent contents are predicted using the method; and

associating the plurality of geographical coordinates with the constituent contents of the plurality of agricultural products.

Claim 28 (original): The method of claim 27, further including generating a map of the constituent content of the agricultural products using the plurality of geographical coordinates and the associated constituent contents.

Claim 29 (original): The method of claim 28 wherein the generating step includes generating a grid map.

Claim 30 (original): The method of claim 28 wherein the generating step includes generating a contour map.

Claim 31 (original): The method of claim 21, further including calculating average values for the data points and wherein the normalizing step includes normalizing the average values.

Claim 32 (original): The method of claim 21, further including linearizing the normalized data points.

Claim 33 (original): The method of claim 32 wherein the linearizing step includes calculating a logarithm of each of the data points.

Claim 34 (original): The method of claim 21 wherein the receiving step includes receiving the light signal from moving stream of the agricultural product.

Claim 35 (original): The method of claim 21 wherein the receiving step includes receiving the light signal from a stopped stream of the agricultural product.

Claim 36 (original): A method for converting a light signal into an electrical signal for use in predicting a constituent content of an agricultural product, comprising:

receiving a light signal from an agricultural product;

converting the light signal into an electrical signal;

digitizing the electrical signal to produce a plurality of data points; and

normalizing the data points using a reference signal value to produce a plurality of normalized data points, the normalized data points having values related to a constituent content of the agricultural product, wherein the reference signal value corresponds with a magnitude of a received light signal at a specific wavelength without being transmitted through the agricultural product.

Claim 37 (original): A method for converting a light signal into an electrical signal for use in predicting a constituent content of an agricultural product, comprising:

receiving a light signal from an agricultural product;

converting the light signal into an electrical signal;

digitizing the electrical signal to produce a plurality of data points; and

normalizing the data points using a reference signal value to produce a plurality of normalized data points, the normalized data points having values related to a constituent content of the agricultural product, wherein the reference signal value corresponds with a magnitude of a received light signal transmitted through a gating mechanism and without being transmitted through the agricultural product.

Claim 38 (original): An apparatus for measuring a constituent content of an agricultural product, comprising:

a device for forming a stream of the agricultural product;

an optical sensing window in the device for passing the stream of the agricultural product;

a radiation source contained within the housing for irradiating the stream of the agricultural product as the stream of the agricultural product passes through the optical sensing window;

a receiver for receiving radiation transmitted through the stream of the agricultural product and for converting the received radiation into a corresponding electrical signal; and

a computer, coupled to the receiver, for receiving the electrical signal and for processing the electrical signal to generate data for use in determining a constituent content of the agricultural product, the computer operating to:

digitize the electrical signal to produce a plurality of data points; and

normalize the data points using a reference signal value to produce a plurality of normalized data points, the normalized data points having values related to a constituent content of the agricultural product, wherein the reference signal value is related to a magnitude at a wavelength of the light signal substantially unaffected by the constituent content.

Claim 39 (original): The apparatus of claim 38 wherein the computer operates to use, as the reference signal value, a value derived from the magnitude using a mathematical function.

Claim 40 (original): The apparatus of claim 38 wherein the computer operates to use as the reference signal value a value related to magnitudes at a plurality of wavelengths including the wavelength of the light signal substantially unaffected by the constituent content.

Claim 41 (original): The apparatus of claim 38 wherein the computer operates to use as the reference signal value an average magnitude value of a range of magnitude values at a pair of wavelengths centered around the reference wavelength.

Claim 42 (original): The apparatus of claim 38 wherein the computer operates to predict protein content of the
agricultural product using the plurality of normalized data points.

Claim 43 (original): The apparatus of claim 38 wherein the computer operates to normalize the data points selectively using one of the following plurality of reference signal values: a magnitude at a wavelength of the light signal substantially unaffected by the constituent content, a magnitude of a received light signal without being transmitted through the agricultural product at specific wavelengths, or a magnitude of a received light signal transmitted through a gating mechanism and without being transmitted through the agricultural product.